

Name: \_\_\_\_\_

## Final Exam Study Guide

### Algebra 1B 2016

**\*We will be completing this study guide in parts. If you know how to complete all problems on this Study Guide AND complete additional suggested items, you will do very well on the Final Exam.**

**\*If you choose to skip a night of studying and practice, you probably will not do as well as you would like!**

**\*Remember that you should also practice ADDITIONAL problems offered, actively PARTICIPATE in all classroom REVIEW, and attend TUTORIAL!**

**\*Twenty minutes per night starting TONIGHT!**

**\*Please answer all written responses in at least TWO complete sentences using at least THREE algebraic terms.**

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### Part One: Functions and Linear Equations

#### Extra Practice: p. 734 #27-40

**1. Comparing:** Please define relation and function and describe the relationship between the two.

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**2.** Describe a real-world situation that can be modeled by a function.

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**3. Fill in the table below:**

Type	Example	Describe solution algebraically	Describe solution graphically
<b>Single-Variable Equation</b>			
<b>Linear Equation</b>			
<b>System of Linear Equations</b>			
<b>System of Linear Inequalities</b>			
<b>Quadratic Equation</b>			

**4. Writing Equations:** Write an equation in the requested form using the given information.

a) Write the equation for the line in slope-intercept form that has a y-intercept of seven and a slope of one.

b) Write the equation for the line in slope-intercept form that passes through (2, -1) and (4, -5).

c) Write an equation for the line in slope-intercept form that passes through  $(-8, 1)$  and is parallel to the line:  $y = -\frac{1}{4}x + 2$ .

d) Write an equation for the line in slope-intercept form that passes through  $(2, -3)$  and is perpendicular to the line:  $x - 2y = -9$ .

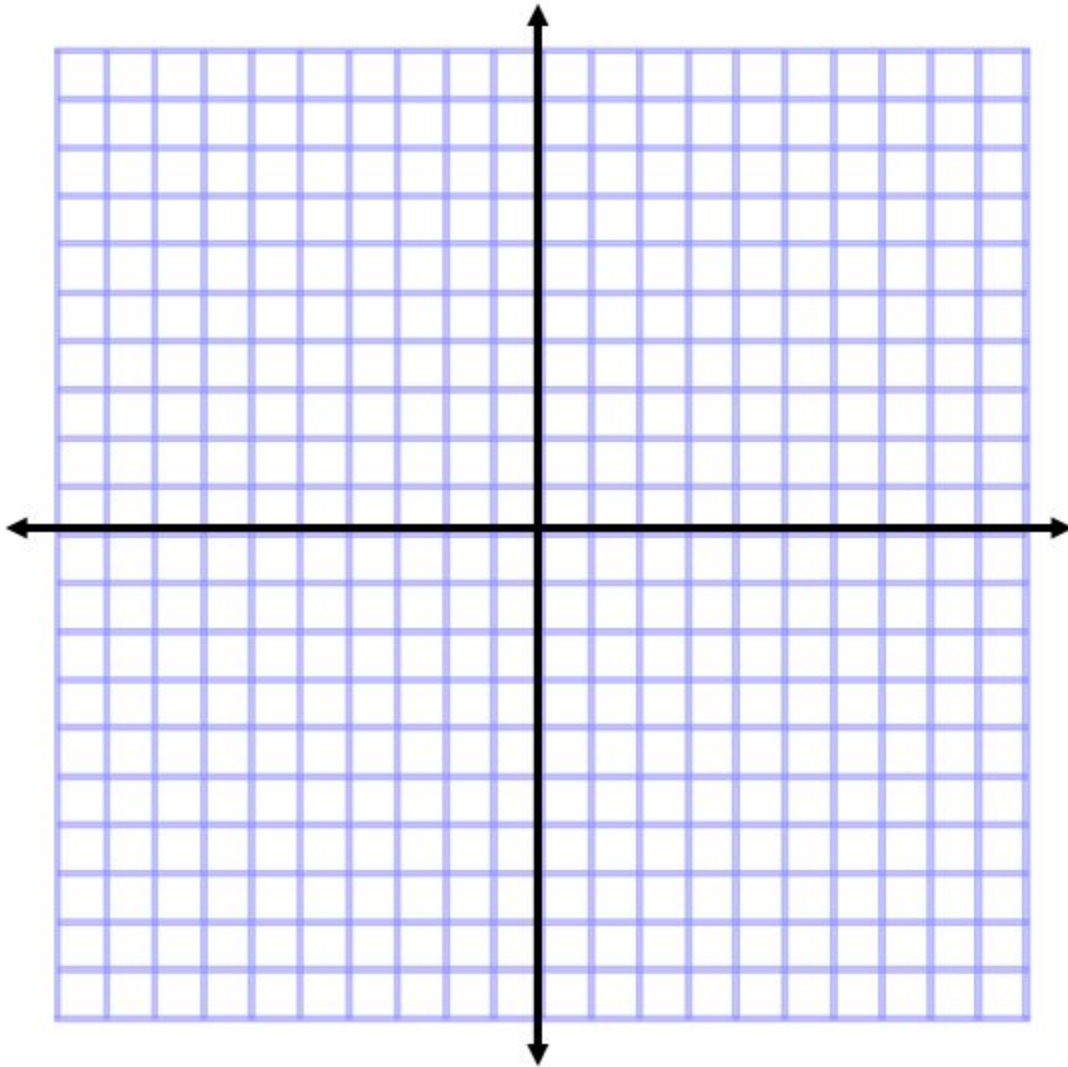
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**Part Two: Systems of Linear Equations and Inequalities; Exponents**

**Extra Practice: p. 736 #4-12, 25-30, p.738 #1-16**

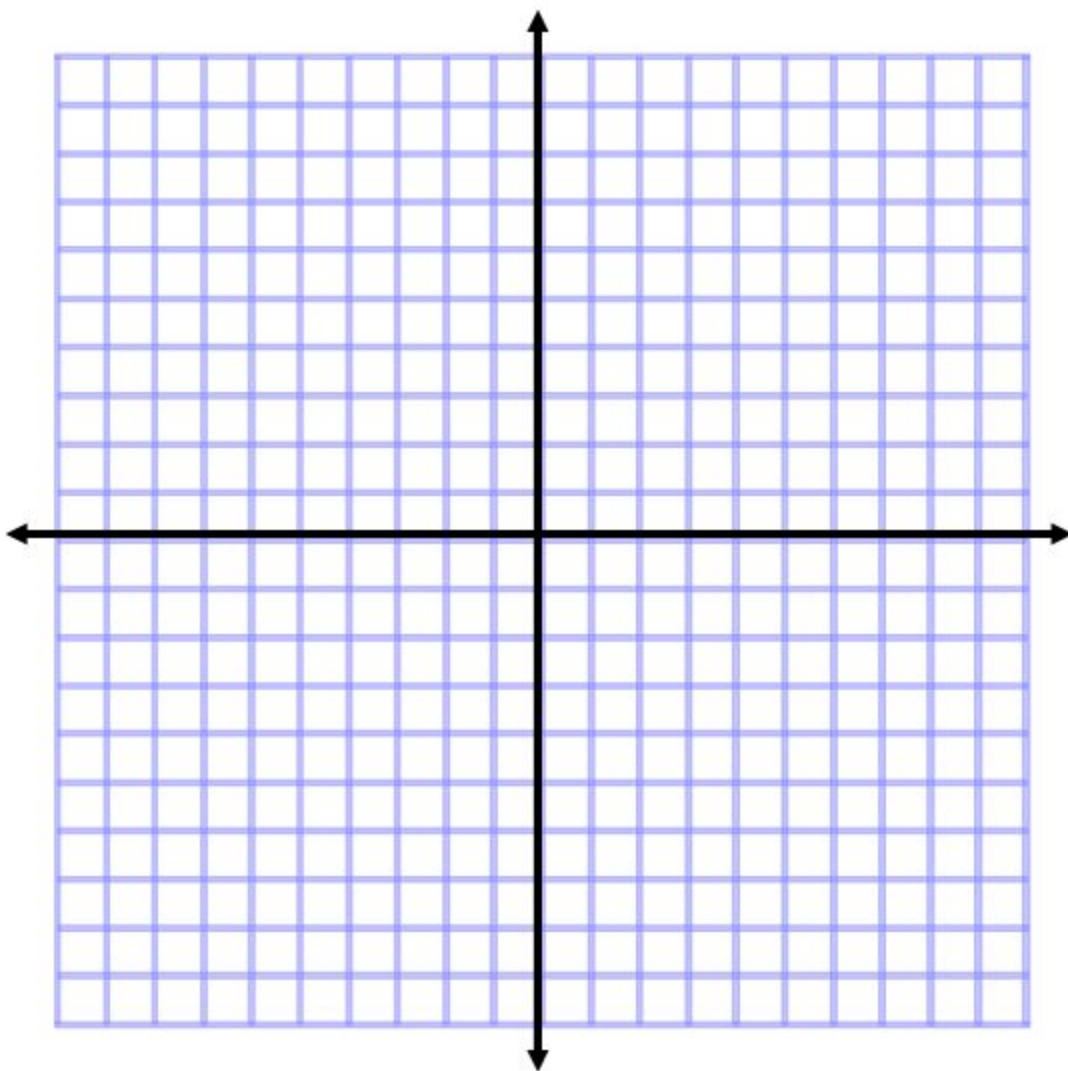
5. Graphing Linear Equations: Please graph the linear equations on the coordinate plane provided. NAME and EXTEND YOUR LINES.

$y = \frac{2}{5}x - 1$        $y = -5$        $3x - y = -9$        $x = 1$



6. **Systems:** Please solve each system **using the method of your choice** Please write your answer as a coordinate (if possible). Good advice: CHECK your work using SUBSTITUTION.

- a) Suggestion (not required): Solve by GRAPHING:  $y = \frac{2}{3}x + 2$   
 $2x - 3y = 6$



Answer: (\_\_\_\_\_, \_\_\_\_\_) or \_\_\_\_\_

b) Suggestion (not required): Solve by SUBSTITUTION:  $y = 4x - 8$   
 $y = 2x + 10$

Answer: (\_\_\_\_\_, \_\_\_\_\_) or \_\_\_\_\_

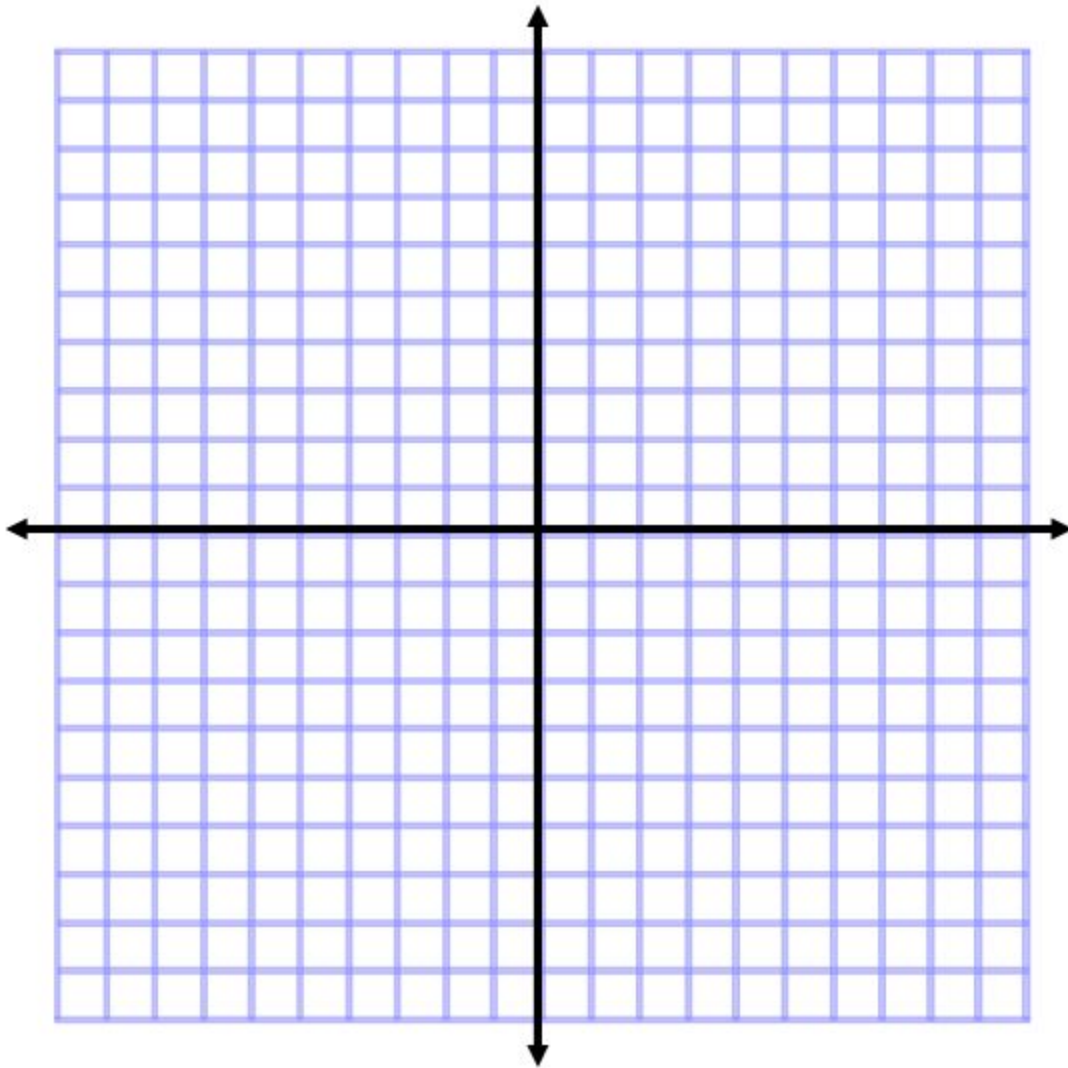
c) Suggestion (not required): Solve by ELIMINATION:  $3x + 6y = -6$   
 $-5x - 2y = -14$

Answer: (\_\_\_\_\_, \_\_\_\_\_) or \_\_\_\_\_

7. Please graph the system of linear inequalities. Remember to NAME and EXTEND your lines. Don't forget to clearly shade the OVERLAP.

$$y < 2x + 4$$

$$-3x - 2y \geq 6$$



**8. Simplify COMPLETELY (no negative exponents):**

a.  $(4x^2)(2x^3)^4$

b.  $(8d)^{-1}$

c.  $(-3,000abc^4)^0$

d.  $\frac{2j^2k^9m^{-3}}{4j^{-4}km^2}$

e.  $\frac{(3a^2b^{-3}c^{-4})^2}{9a^4b^{-1}c^{-5}}$

**Name:** \_\_\_\_\_

**Part Three: Naming and Operations with Polynomials; Factoring**  
**Extra Practice: p. 740 #1-8, 11-38, 41-68**

9. Write each polynomial in simplified, standard form. THEN, name the polynomial by degree and by term.

a.  $-8 + 2x - x^2 + 8x$

b.  $9c^3 - 2$

c.  $-900$

d.  $\frac{8}{x}$

10. Complete each operation. Write your answers in simplified, standard form.

a.  $(2x^2y - 5x^3 - x^2 + 4) - (-6x^2y + 2x^3 + 3x^2 - 2x)$

b.  $-2a^4b(a - b^3 + 3bc)$

c.  $(x + 4)(2x - 7)$

d.  $(4x + z)(4x - z)$

e.  $(2a + b)^2$

11. **Factor:** Please factor AS COMPLETELY AS POSSIBLE!

a.  $y^2 + 5y - 24$

b.  $3x^2 - 10x + 8$

c.  $12x^3 - 42x^2 + 16x - 56$

d.  $x^2 - 16$

e.  $8x^2y - 4x^2$

**Part Four: Word Problems**

**Extra Practice: p. 729 #67, 68; p.736-7 #13, 18, 33; p.739 #83, 85;  
p.743 #65, 67**

**12. Systems Word Problems: Choose Problem #1 OR Problem #2. (Note: you will also have CHOICE on the Final Exam.)**

**Problem #1:** Eva and Sara own a farm with some ducks and some pigs. There are ninety-four animals on the farm and two hundred sixty-four legs. How many ducks do they have? How many pigs? **You must write and solve a system of equations in order to solve the problem.**

**OR**

**Problem #2:** Dante has one hundred gallons of twenty-five percent grape juice and Justin has sixty gallons of fifty percent grape juice. How many gallons of each person's grape juice do they need to mix in order to have forty gallons of forty-five percent grape juice? **You must write and solve a system of equations in order to solve the problem.**

a. Define variables that make sense for the situation.

a<sub>1</sub>. If you chose the mixtures problem, make a prediction: \_\_\_\_\_

b. Write and solve a system of linear equations.

c. Check via substitution.

d. Write your answers with labels.

**13. Exponential Word Problems: Choose Problem #1 OR Problem #2. (Note: you will also have CHOICE on the Final Exam.)**

**Problem #1:** Emilia deposits \$4,590 into a savings account with a 2.8% annual interest rate. Her savings account is compounded quarterly. Assuming Emilia makes no deposits or withdrawals, how much money will be in Emilia's account after 5 years? **You must write and solve an exponential equation in order to solve the problem. Round to the nearest cent, if necessary.**

**OR**

**Problem #2:** AJ is creating a fictional story in which dinosaurs are still alive. In his story, there are 568,231 dinosaurs remaining and the population is decreasing an annual rate of 4.6%. If his story is set in 2110, how many dinosaurs will still be "alive" in 2118? **You must write and solve an exponential equation in order to solve the problem. Round to the nearest dinosaur (whole number), if necessary.**

a. Write the GENERAL exponential growth/decay equation (no numbers).

b. Substitute your given values into the equation.

c. Solve. Write your answer with a label.

d. Reality check: Does your answer make sense for the situation? Explain.

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**14. Quadratic Word Problem: Choose Problem #1 OR Problem #2. (Note: you will**

also have CHOICE on the Final Exam.)

**Problem #1:** Kemari throws a ball from an initial height of seven feet with an initial upward velocity of forty feet per second. After how many seconds will the ball hit the ground? Round to the nearest hundredth, if necessary.

**OR**

**Problem #2:** Christian punts a football from an initial height of 3 feet with an initial upward velocity of 48 ft/sec. After how many seconds will the ball reach its maximum height? What will the maximum height be? Round to the nearest hundredth, if necessary.

a. Write the general parabolic motion formula.

b. Substitute your given values into the formula.

c. Solve. Write your answer(s) with (a) label(s).

d. Reality check: Does your answer make sense for the situation? Explain.

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### Part Five: Mixed Multiple Choice and Quadratic Knowledge

**Extra Practice: Extra Practice: p. 738 #33-40, p. 742 #5-17**

**15. Multiple Choice: Write the CAPITAL LETTER of the correct answer in the blank provided.**

a. \_\_\_\_\_ The zero product property states that:

- a) if  $ab = 0$ , then  $a = 0$  and  $b = 0$ .
- b) if  $ab = 0$ , then neither  $a$  or  $b = 0$ .
- c) if  $ab = 0$ , then either  $a = 0$ ,  $b = 0$ , or  $a$  and  $b$  both  $= 0$ .
- d)  $a(0) = 0$  and  $b(0) = 0$ .

b. \_\_\_\_\_ The first step to factoring is always:

- e) checking for the GCF      f) completing the reverse FOIL process
- g) FOILing      h) crying

c. \_\_\_\_\_ Multiplying a trinomial by a polynomial with five terms requires \_\_\_\_\_ multiplications:

- a) three      b) five      c) eight      d) fifteen

d. \_\_\_\_\_ The factored form of  $a^2 - b^2$  is:

- e)  $(a - b)(a + b)$       f)  $(a - b)(a - b)$       g)  $(a + b)(a + b)$       h)  $(a^2 - b^2)(a^2 - b^2)$

e. \_\_\_\_\_ You have sixteen grams of a certain bacteria that increases by a rate of 18% hourly. How many grams of the bacteria will remain after fourteen hours? Which equation correctly models this situation?

- a)  $0 = -16t^2 + 18t + 14$       b)  $y = 16 * 1.18^{14}$
- c)  $y = 16 * 0.82^{14}$       d)  $y = 18x + 14$

f. \_\_\_\_\_ A ball is thrown on Earth with an upward velocity of eighteen feet/sec from an initial height of fourteen feet. After how many seconds will the ball hit the ground? Which equation correctly models this situation?

- e)  $0 = -16t^2 + 18t + 14$       f)  $y = 16 * 1.18^{14}$
- g)  $y = 16 * 0.82^{14}$       h)  $y = 18x + 14$

g. \_\_\_\_\_  $(6.0 \times 10^{-8})(4.0 \times 10^{12}) =$  \_\_\_\_\_. Answer must be in proper scientific notation.

- a)  $24 \times 10^4$       b)  $10 \times 10^4$       c)  $2.4 \times 10^3$       d)  $2.4 \times 10^5$

h. \_\_\_\_\_ What is the conjugate of  $10 - \sqrt{7}$ ?

a) 7      b.  $\sqrt{7}$       c.  $10 + \sqrt{7}$       d.  $\sqrt{10} + \sqrt{7}$

i. \_\_\_\_\_ Simplify:  $\frac{9.0 \cdot 10^{-7}}{3.0 \cdot 10^{-3}}$ . Your answer must be in proper scientific notation.

a)  $3.0 \times 10^{-4}$       b.  $3.0 \times 10^4$       c.  $3.0 \times 10^{-10}$       d.  $6.0 \times 10^4$

# 16. Analyzing the Graphs of Quadratic Functions: Fill in the table.

QF	Does the parabola open upward or downward?	Is the vertex a minimum or maximum?	Is the parabola narrower, wider or the same width as parent QF?	Write the axis of symmetry equation.	Write the coordinates of the vertex.
$y = -1/2x^2$					
$y = x^2 - 4$					
$y = -19x^2 + 8$					
$y = -x^2 + 6x$					

# 17. Quadratic Knowledge

a. Write the equation of the parent quadratic function:

b. Write the coordinates of the vertex of the parent quadratic function: (\_\_\_\_, \_\_\_\_)

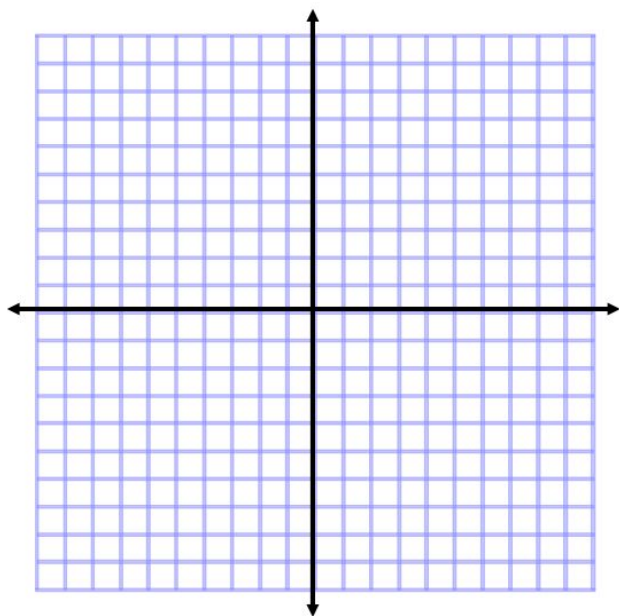
c. Write the quadratic formula.

x =

# 18. Graphing a Function in the Form: $y = ax^2 + bx + c$ . Graph the function

$y = -1/2x^2 + 2x - 3$  on the coordinate plane. Fill in ALL requested information.

axis of symmetry equation: _____	vertex: (____, ____)
point #1: (____, ____)	reflection of point #1: (____, ____)
point #2: (____, ____)	reflection of point #2: (____, ____)



## Part Six: Quadratic Equations, Transformations, Radicals and More

**Algebraic Writing**  
**Extra Practice: p. 742 #21-38, p.744 #1-21**

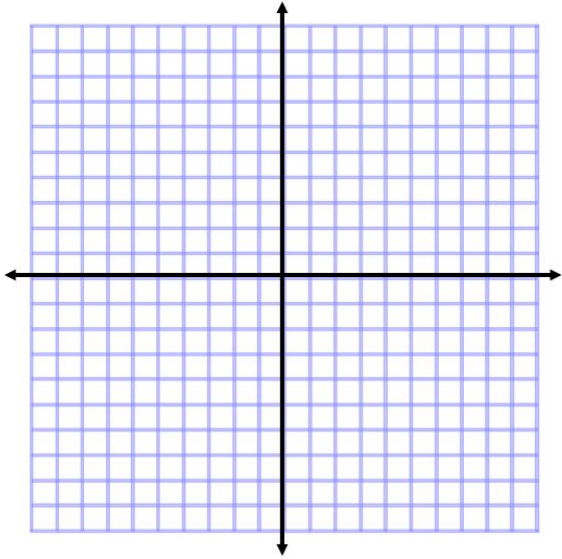
**19. Quadratic Equations:** Please solve the following quadratic equations using a method of your choice.

a)  $-x^2 - 3 = 0$  (suggestion: sketch the graph of the related QF)

b)  $4x^2 + 1 = 5$  (suggestion: square root method)

c)  $10x^2 - 41x = 18$  (suggestion: factor or use quadratic formula)

## 20. Transformations:

	<p>a. Graph the quadrilateral with the given vertices. LABEL and CONNECT the vertices.  A (4, 5)    B (4, -2)  C (6, 5)    D (6, -2)</p> <hr/> <p>b. Reflect the quadrilateral over the y-axis. LABEL and CONNECT the vertices and write the new vertices below.  A' (____, ____ )    B' (____, ____ )  C' (____, ____ )    D' (____, ____ )</p> <hr/> <p>c. Translate your quadrilateral from part b with the rule: <math>(x + 2, y - 1)</math>.  LABEL and CONNECT the vertices and write the new vertices below.  A'' (____, ____ )    B'' (____, ____ )  C'' (____, ____ )    D'' (____, ____ )</p>
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## 21. Radical Expressions: Simplify each radical expression completely:

a. $\sqrt{500}$	b. $4\sqrt{6}(2\sqrt{3} + 5\sqrt{10})$	c. $\frac{8}{\sqrt{2}}$
d. $8\sqrt{32} - 4\sqrt{18}$	e. $(5 - \sqrt{6})^2$	f. $\frac{6}{\sqrt{11} - \sqrt{5}}$

## 22. More Algebraic Writing:

a. When Mars and Earth are at aphelion, they are 401,000,000 kilometers apart. You leave for Mars when they are at aphelion and travel at a speed of 20,000 kilometers per hour. Using scientific notation to write both of these numbers, please describe how you would calculate the number of hours it would take you to travel from Earth to Mars.

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b. Choose one of the following professions and explain how you would use algebra in your daily work life. Be as specific as possible with the exact algebra skills.

baker      car salesman      banker      quarterback coach      chemist

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